Simulation Based Acquisition Conference

May 14-17, 2001
Springfield, VA

Leveraging Commercial Data Interchange Standards

16 May 2001

Ron Schuldt
Senior Staff Systems Architect
Lockheed Martin Enterprise Information Systems
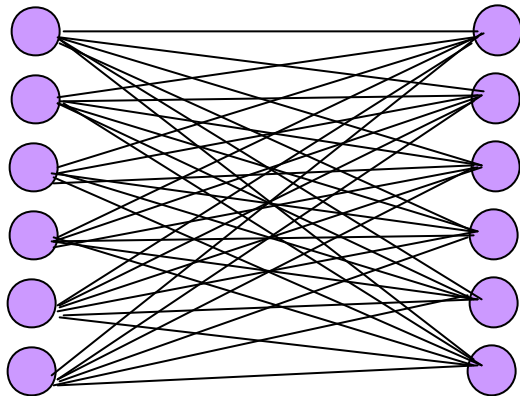**ron.l.schuldt@lmco.com**

Agenda

- Why Specs and Standards?

- Why eXtensible Markup Language (XML)?

- XML's Envisioned Role

- XML Specs and Standards Framework
  - XML Foundation Specifications
  - XML Architecture Specifications
  - XML Content or "Payload" Standards

- Industry-wide Harmonization Across Standards
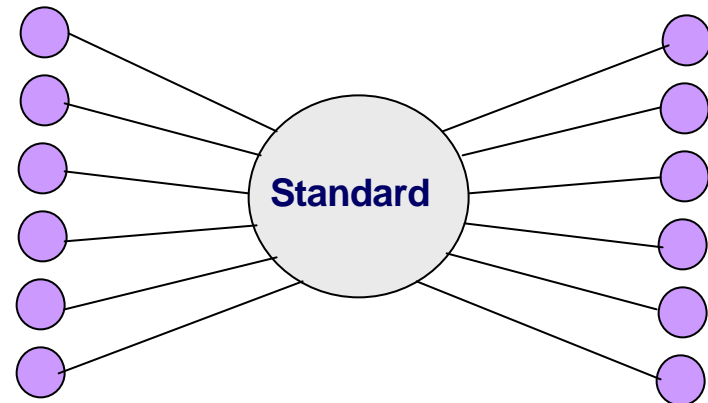
Why Specs and Standards?

Data Content

N (N-1) Mappings – Point-to-Point

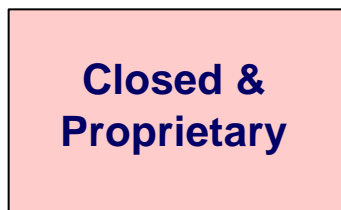**2N Mappings – Industry Standard**

OR

Standard

According to the Gartner Group, 35-40% of all programming effort in a typical computing environment is devoted to developing and maintaining interfaces

Architecture

Costly to build interfacing applications

Easier and less costly to build interfacing applications

Closed & Proprietary

OR

Open

3

Why eXtensible Markup Language (XML)?

> "No Microsoft software product will remain untouched by XML"

Peter Plamondon, Mgr Developer Relations, Microsoft

> "Starting with Oracle8i, … all Oracle products will fully support XML …"

http://technet.oracle.com/tech/xml/

> "mySAP.com™ is built on e-business standards and technologies such as XML, HTML, HTTP, and Simple Object Access Protocol (SOAP) to ensure openness and interoperability."

http://www.sap.com/solutions/technology/index.htm

Critical Mass Has Been Achieved

The Major Vendors Are XML Enabling Their Applications

Tiny Sample of Current/Future XML Standards

- HL7 - Health Care
- OTA – Open Travel Alliance
- IFX - Interactive Financial Exchange
- FPML – Financial Products
- EML – Election Markup Language
- HR-XML – Human Resources and Benefits
- RosettaNet – Information Technology Industry
- ACORD – XML for the Insurance Industry
- GML – Geography Markup Language
- MatML – Material Property Data Markup Language
- OMF – Weather Observation Markup Format

Syntax and Semantics in XML

Industry-wide Standards

AIA ICs - EDI

Syntax
Semantics

AIA – XEDI (XML)

DTDs &
Data
Dictionary

UDDI - XML

Syntax
Semantics

AIA Harmonization

Resolve
Overlaps

EIA-836 - XML

Syntax
Semantics

XML's Envisioned Role

Interfaces to Legacy Systems

Transformations

Gov't XML

Banking XML

Banks

Customers

aerospace & defense

global trading exchange

EXOSTAR

xCBL

Firewall

Manage Content

Projects Use Content

- Data Dict
- DTDs
- Schema
- Style Sheets

XML Standards In Metadata Repository

XML

Global Trading Web

COMMERCE ONE

XML

Suppliers

Other Exchanges

7

Two Basic Types of Exchange Documents

- **Transactions**
  - Purchase Orders
  - Purchase Order Changes
  - Purchase Order Acknowledgements
  - Purchase Order Change Acknowledgements
  - Invoices
  - Remittance Advice
  - Request for Quote
  - Request for Quote Response
  - Shipping Schedule
  - Etc.

- **Collaboration Documents**
  - Mission Requirements
  - Concept of Operations
  - Specifications
  - Product Designs
  - Engineering Change Proposals
  - Trade-off Studies
  - Test Reports
  - Meeting Minutes
  - Plans
  - Schedules
  - Presentations
  - Etc.

XML Specs and Standards Framework

Content "Payload" Standards

- Others – Insurance, Transportation, Banking
- PLCS – Product Life Cycle Support - Collaboration
- ISO 10303 - STEP - Collaboration
- EIA-836 - Configuration Management - Collaboration
- UDDI - Trading Partner Profile
- AIA EDI – Transactions

Architecture Specifications

- Global ebXML - Architecture Specifications

Foundation Specifications

- W3C's - XML Schema Specification
- W3C's - XML 1.0 Specification - DTDs

9

W3C XML 1.0 Specification

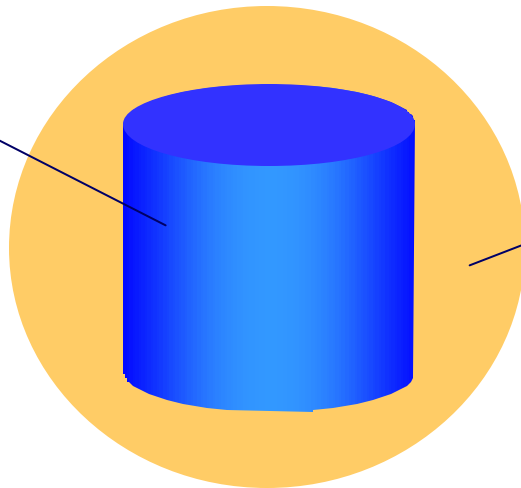## e**X**tensible **M**arkup **L**anguage

XML 1.0 is the foundation standard recommended by W3C in February 1998 to describe other languages

- **a metalanguage**
- **separates data content from its presentation**
- **derived from ISO 8879 (SGML)**

Language
- semantics
- syntax

Business Rules & Methods

XML 1.0 specifies requirements of well-formed and valid XML documents - DTDs

W3C XML Schema Specification
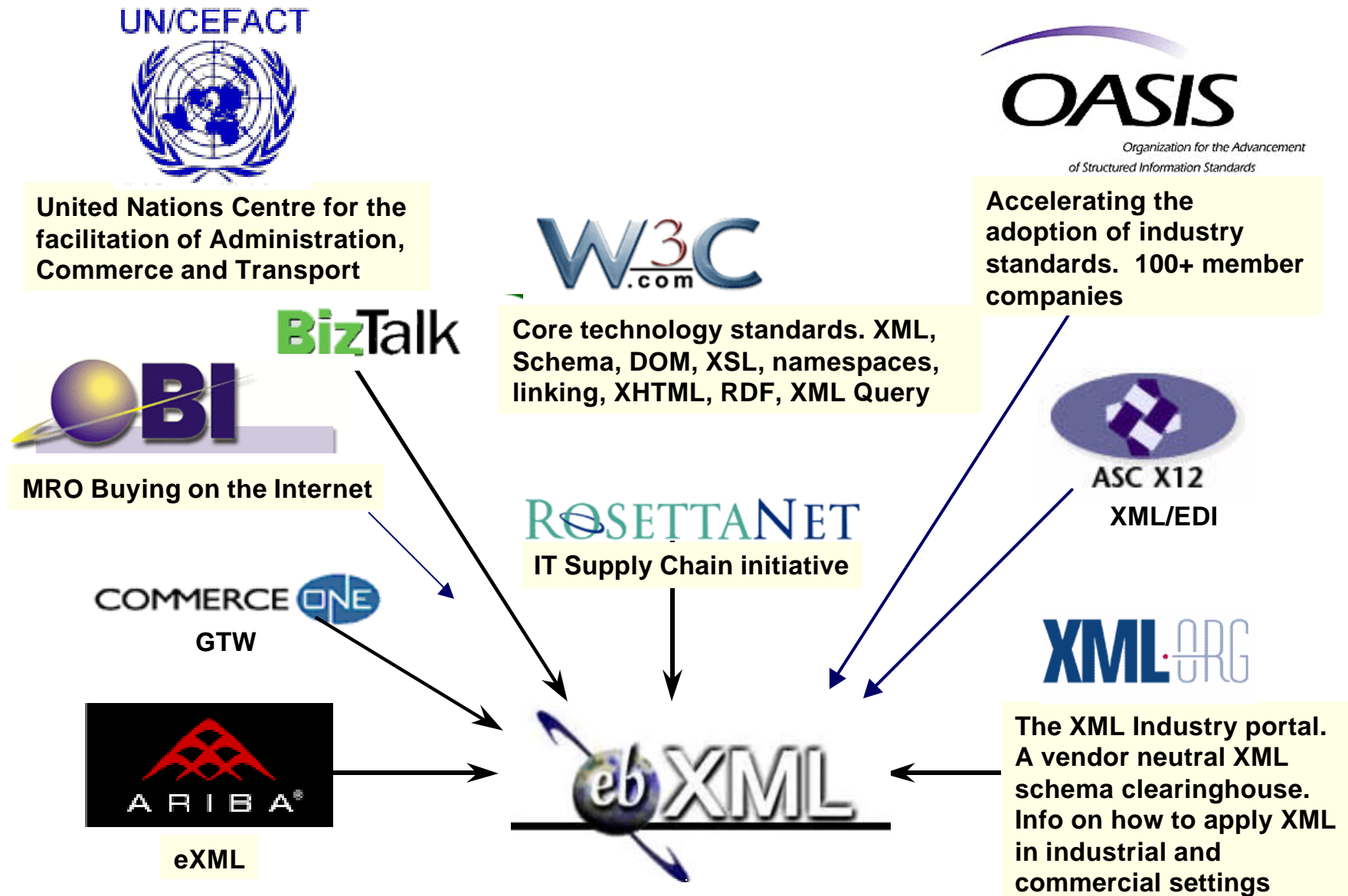
Recommendation status as of May 2, 2001

XML
Schema
Part 0

Primer

XML Schema
Part 1

Structures

XML Schema
Part 2

Data Types

XML Schema enables application-to-application integration with data integrity and validation checks based on an open specification whereas previously the tasks were performed with proprietary solutions

Global ebXML – Major Participants

UN/CEFACT

United Nations Centre for the facilitation of Administration, Commerce and Transport

W3C
.com

OASIS
Organization for the Advancement of Structured Information Standards

Accelerating the adoption of industry standards. 100+ member companies

Core technology standards. XML, Schema, DOM, XSL, namespaces, linking, XHTML, RDF, XML Query

BizTalk

OBI

MRO Buying on the Internet

ROSETTANET

IT Supply Chain initiative

ASC X12
XML/EDI

COMMERCE ONE
GTW

ARIBA®

eXML

ebXML

XML.ORG

The XML Industry portal. A vendor neutral XML schema clearinghouse. Info on how to apply XML in industrial and commercial settings

The Transaction Content Problem

Aerospace Company Business Units

Business Unit A
ANSI X12 V.2002

Business Unit B
ANSI X12 V.2001

Business Unit C
ANSI X12 V.3010

Business Unit D
ANSI X12 V.2040

Supplier

Business Unit D
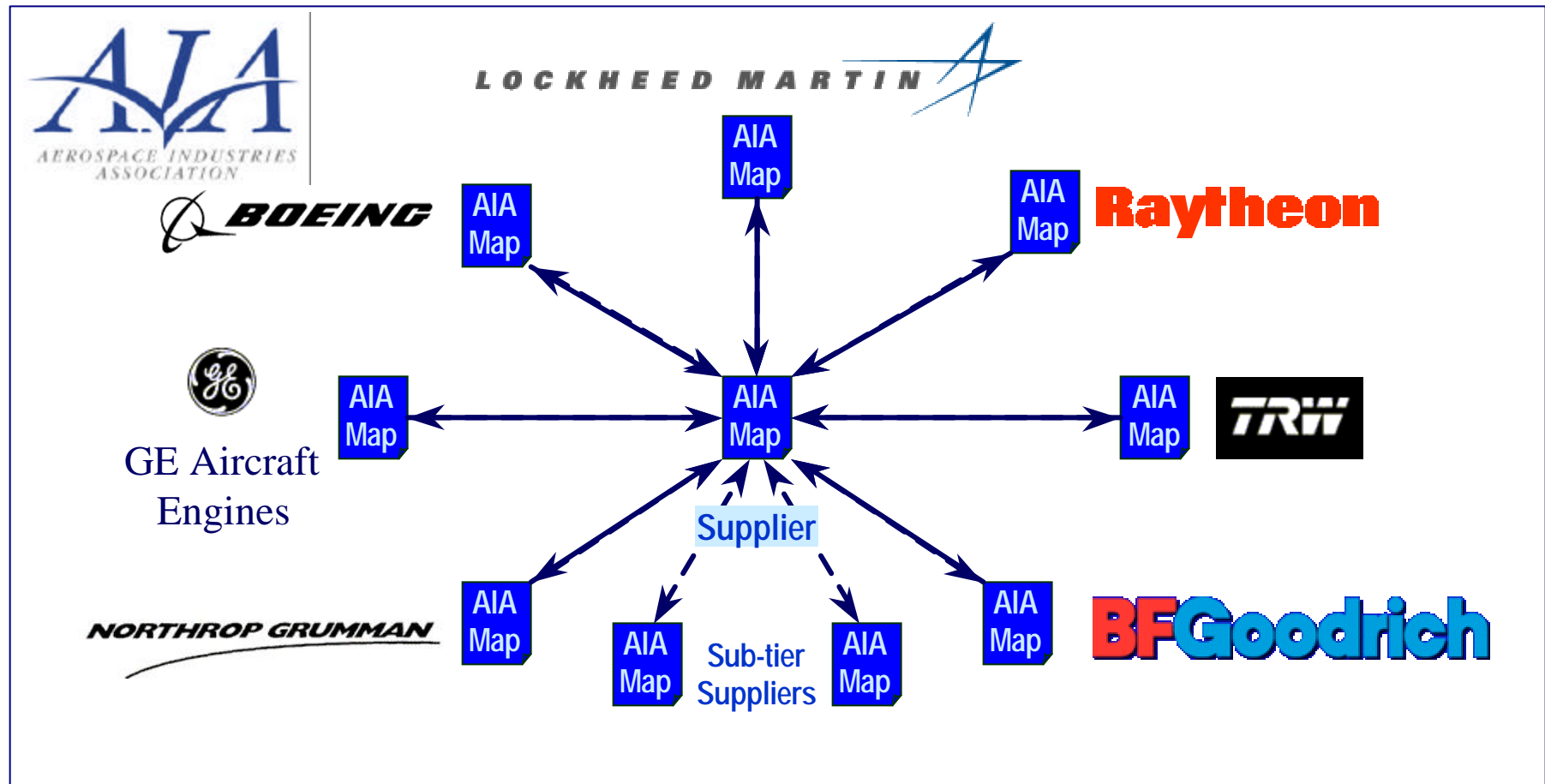ANSI X12 V.2040
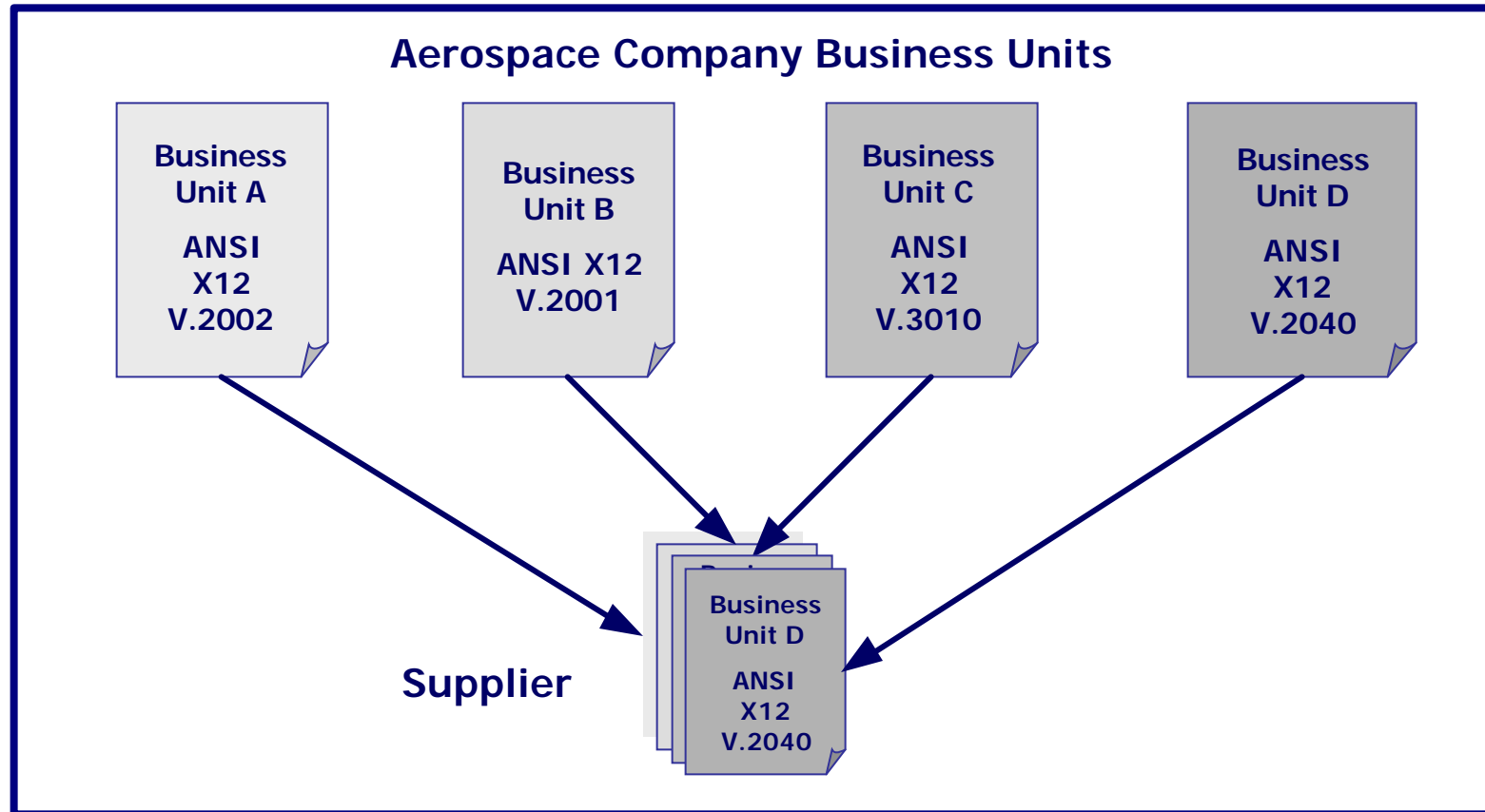
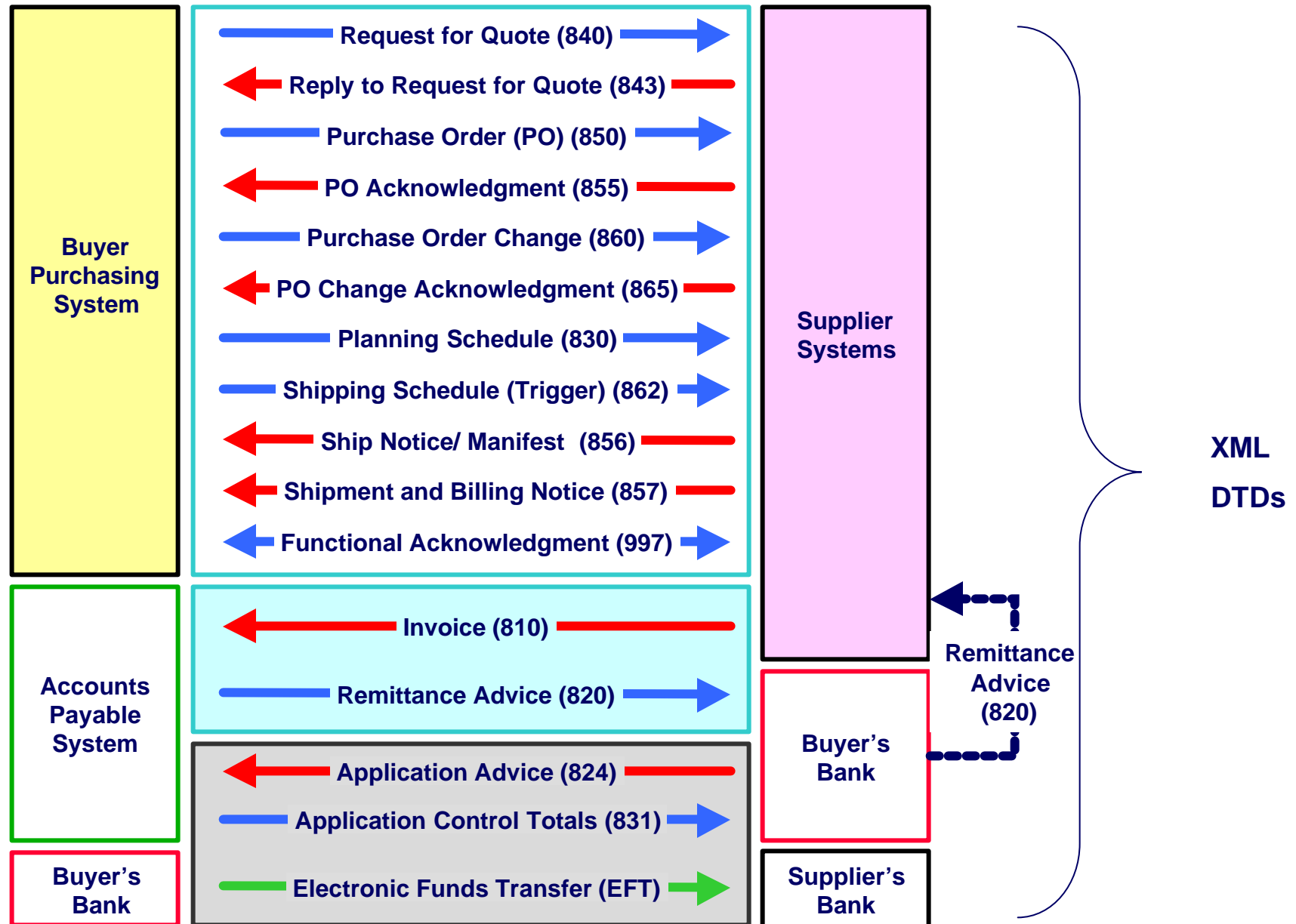# The Problem Magnified Across the Industry
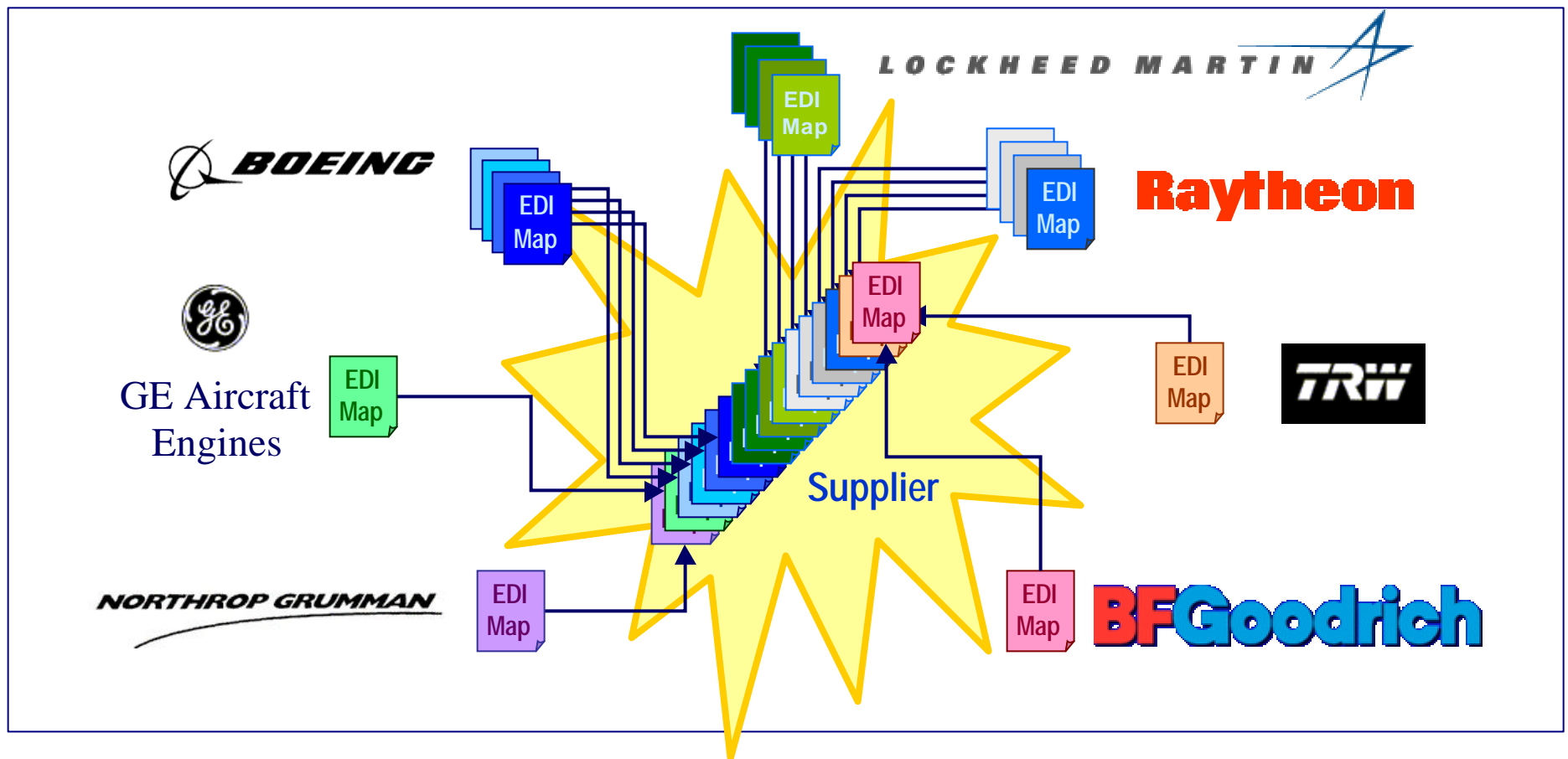
Adds substantial costs throughout supply chain

The Industry-wide Solution

Based on industry-wide best practices

AIA's Harmonized EDI Transactions

Buyer Purchasing System

Supplier Systems

Request for Quote (840) →
← Reply to Request for Quote (843)
Purchase Order (PO) (850) →
← PO Acknowledgment (855)
Purchase Order Change (860) →
← PO Change Acknowledgment (865)
Planning Schedule (830) →
Shipping Schedule (Trigger) (862) →
← Ship Notice/ Manifest (856)
← Shipment and Billing Notice (857)
← Functional Acknowledgment (997) →

Accounts Payable System

← Invoice (810)
Remittance Advice (820) →

Application Advice (824) ←
Application Control Totals (831) →
Electronic Funds Transfer (EFT) →

Buyer's Bank

Buyer's Bank

Supplier's Bank

Remittance Advice (820)

XML DTDs

16

Universal Description Discovery Integration

Global single point to register your business

White Pages

- Who you are
- Where located
- How to contact you

Yellow Pages

- What products and services

Green Pages

- How to conduct business with you

http://www.uddi.org/

EIA-836 Standard

Electronic Industries Association EIA-836
Standard Configuration Management Data Exchange and Interoperability

Record of Authority Transfer

System A

Configuration Managed Documents

System B

**PDM
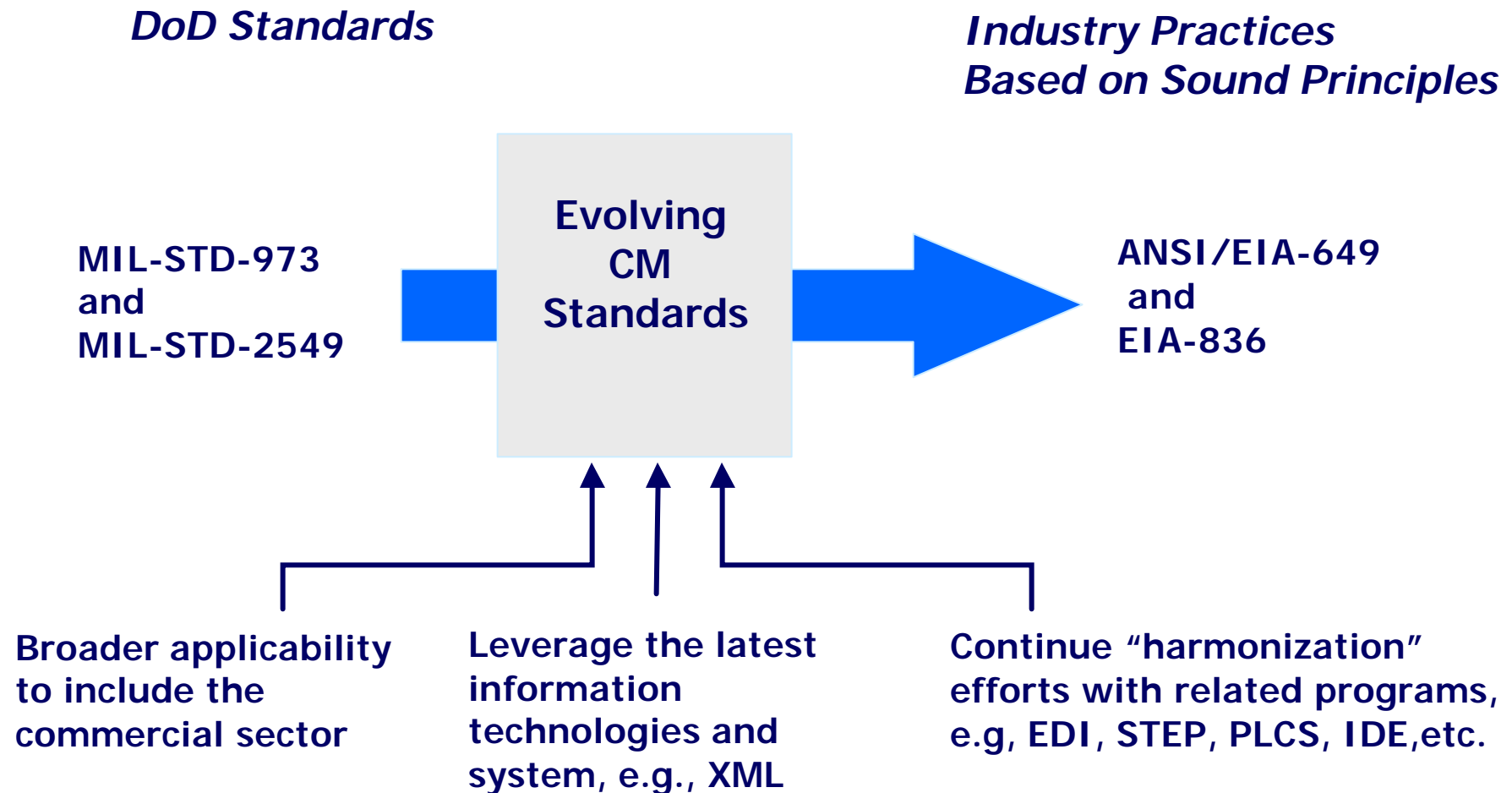or
Doc Mgmt**

**PDM
or
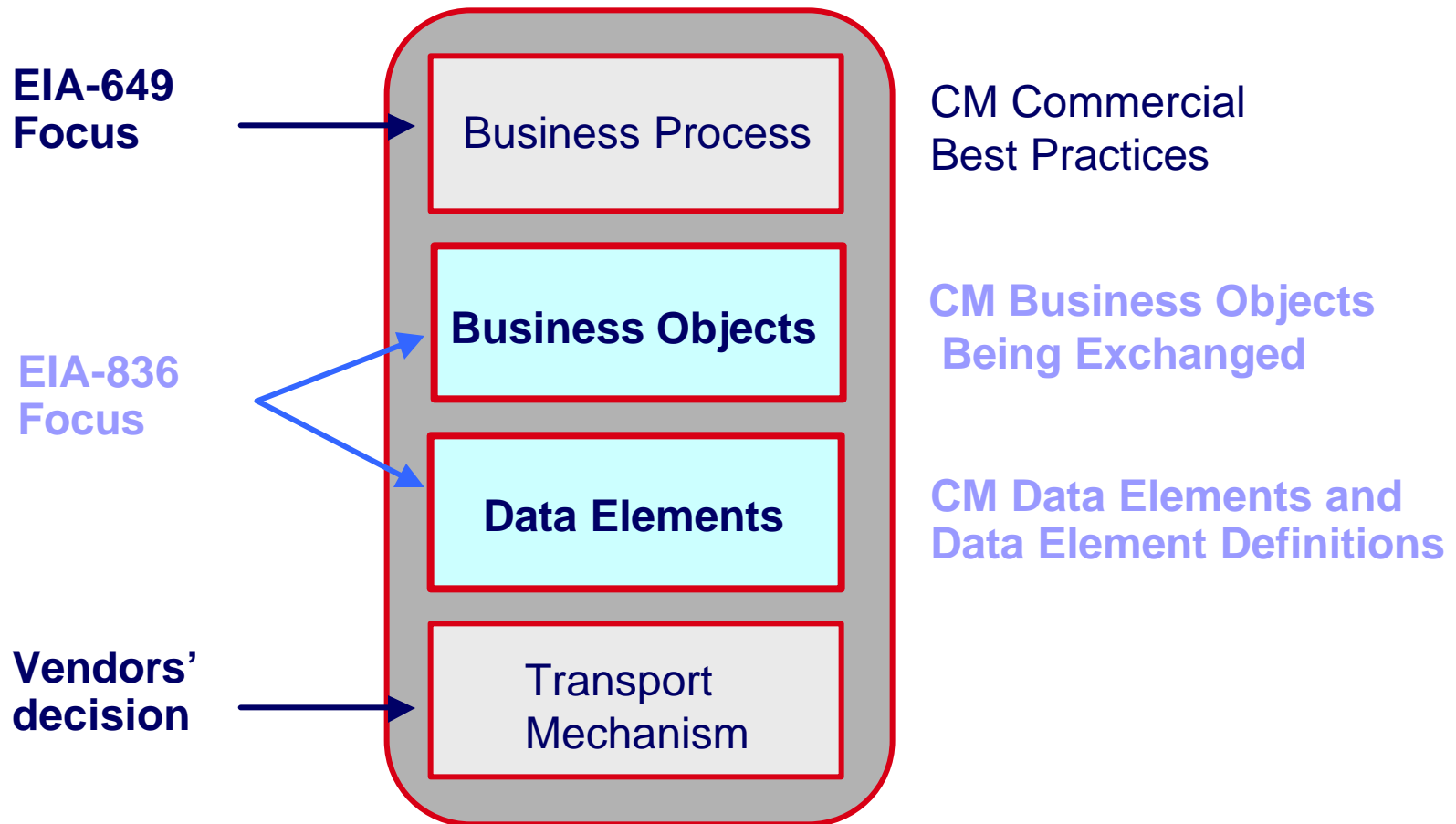Doc Mgmt**

EIA-836 Record of Authority Metadata
- **Document Change History**
- **Product Configuration History**
- **Change Actions/History**

Transfer of record of authority metadata is typically required when final production item is delivered and the data package is delivered from supplier to customer.

EIA-836 Background

DoD Standards

**Industry Practices
Based on Sound Principles**

**MIL-STD-973
and
MIL-STD-2549**

**Evolving
CM
Standards**

**ANSI/EIA-649
and
EIA-836**

**Broader applicability
to include the
commercial sector**

**Leverage the latest
information
technologies and
system, e.g., XML**

**Continue "harmonization"
efforts with related programs,
e.g, EDI, STEP, PLCS, IDE,etc.**

EIA-836 Focus

EIA-649 Focus → Business Process   CM Commercial Best Practices

EIA-836 Focus → **Business Objects**   **CM Business Objects Being Exchanged**

→ **Data Elements**   **CM Data Elements and Data Element Definitions**

Vendors' decision → Transport Mechanism
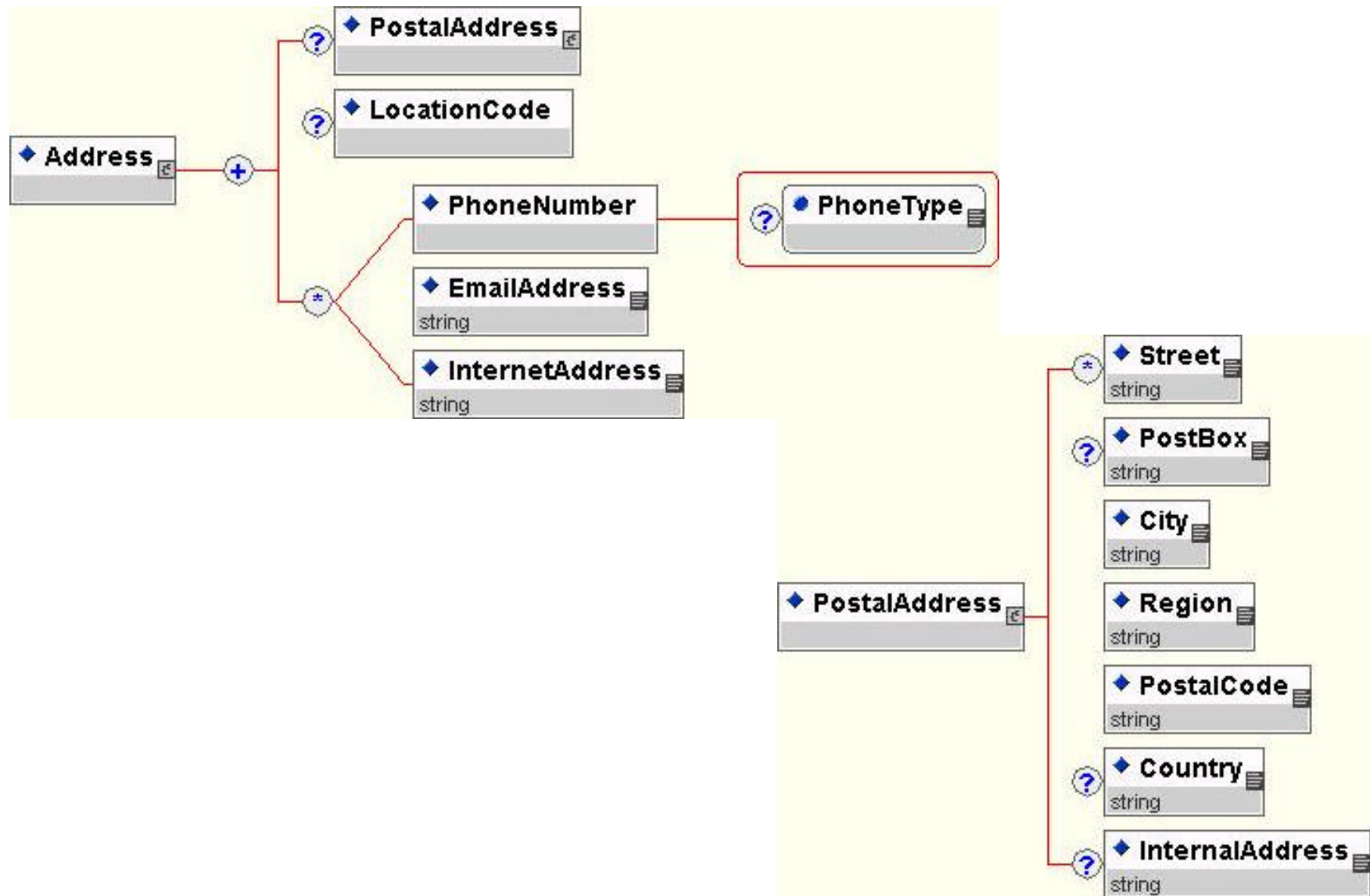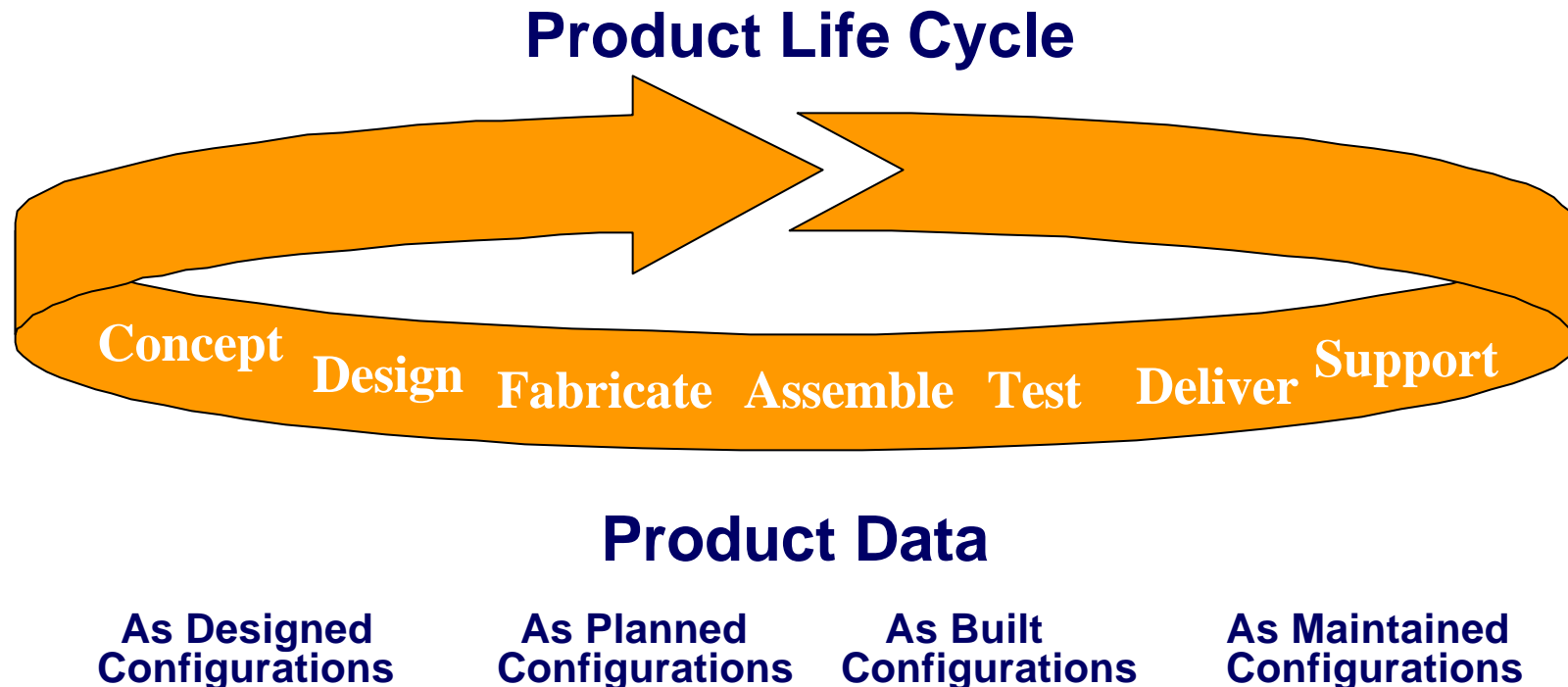
Example EIA-836 DTD for Address

ISO 10303 - STEP

STEP is an international standard (ISO 10303) that provides an unambiguous, computer interpretable definition of the physical and functional characteristics of a product throughout its life cycle

Product Life Cycle

Concept   Design   Fabricate   Assemble   Test   Deliver   Support

Product Data

As Designed Configurations   **As Planned Configurations**   **As Built Configurations**   **As Maintained Configurations**
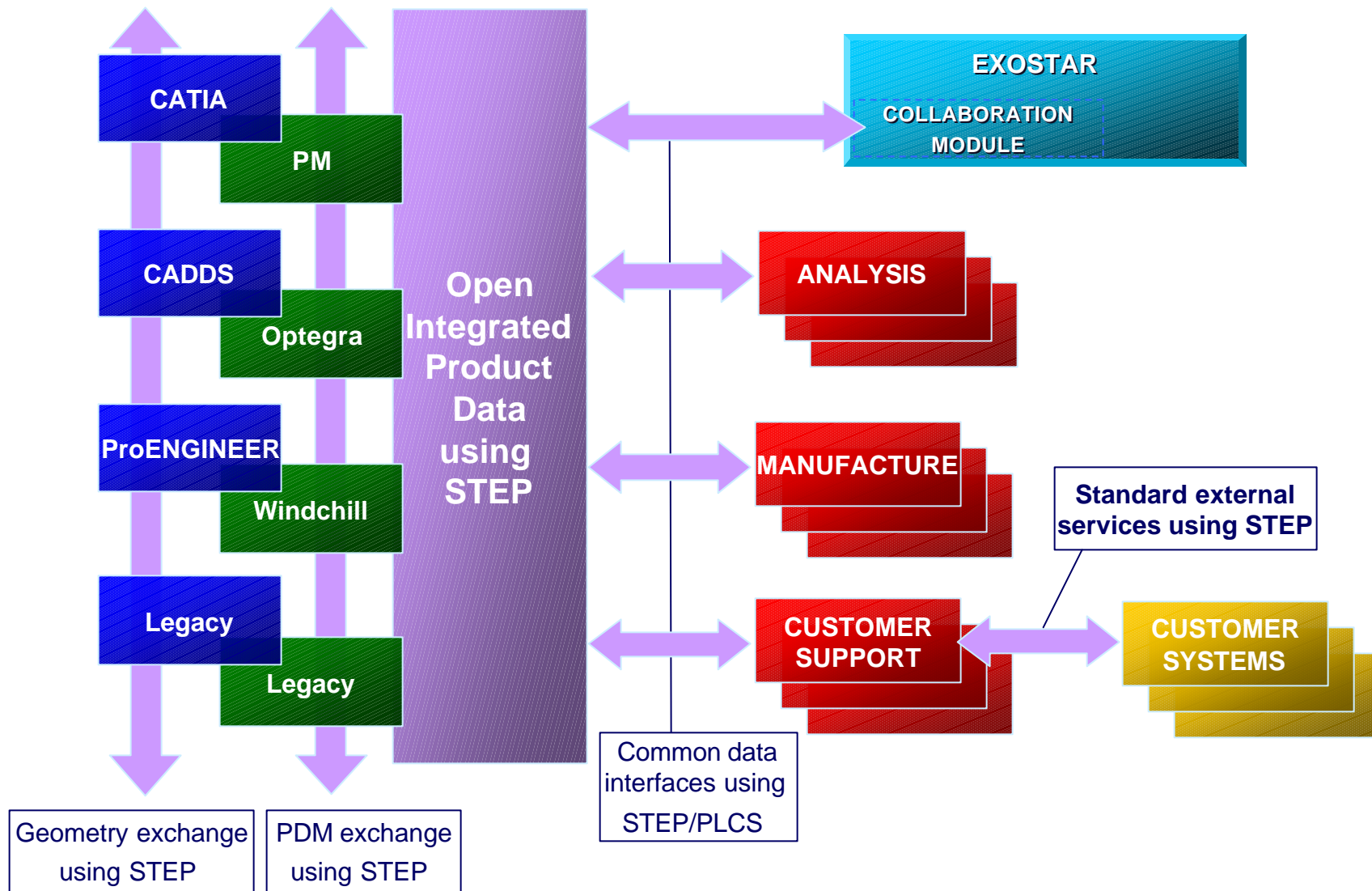
ISO 10303 - Part 28 will enable XMLized STEP

Product Life Cycle Support (PLCS)

- **PLCS was formed to address the horizontal integration shortcomings of STEP**

- **A joint industry and government initiative to accelerate development of new standards for product support information**

- **PLCS Inc. established in 1999 by 14 leading private and public sector organizations**

- **An international project, managed within the ISO framework, to produce draft standard(s) within 3 years.**

- **PLCS utilizes ISO 10303 STEP - the STandard for Exchange of Product model data and EIA-836**

STEP and PLCS in Context

CATIA

PM

CADDS

Optegra

ProENGINEER

Windchill

Legacy

Legacy

Open Integrated Product Data using STEP

EXOSTAR

COLLABORATION MODULE

ANALYSIS

MANUFACTURE

Standard external services using STEP

CUSTOMER SUPPORT

CUSTOMER SYSTEMS

Common data interfaces using STEP/PLCS

Geometry exchange using STEP

PDM exchange using STEP

Overlaps Require Harmonization

AIA Transactions

UDDI

EIA836 Collaboration

STEP Collaboration

Example Overlaps

- Supplier ID

- Address

- Part Number
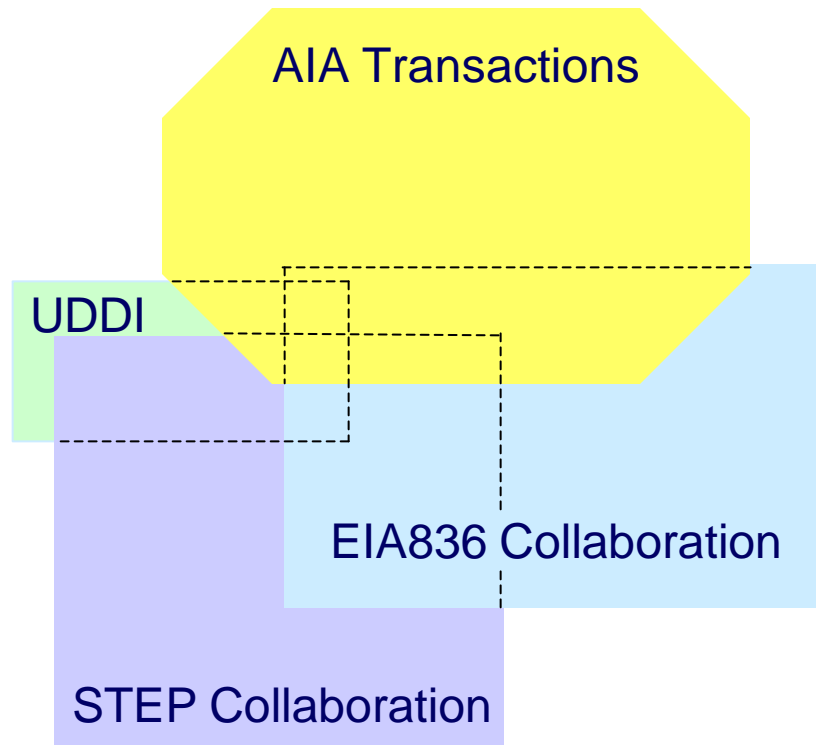
UDDI

- **Universal Unique ID (UUID)**

- Globally unique

- Supports many ID codes

- 128 bit hexadecimal (8 char AN)

EIA-836

- **Organization ID**

- Supports many ID codes

  - CAGE, DUNS, FSCM, etc.

- ID length not specified
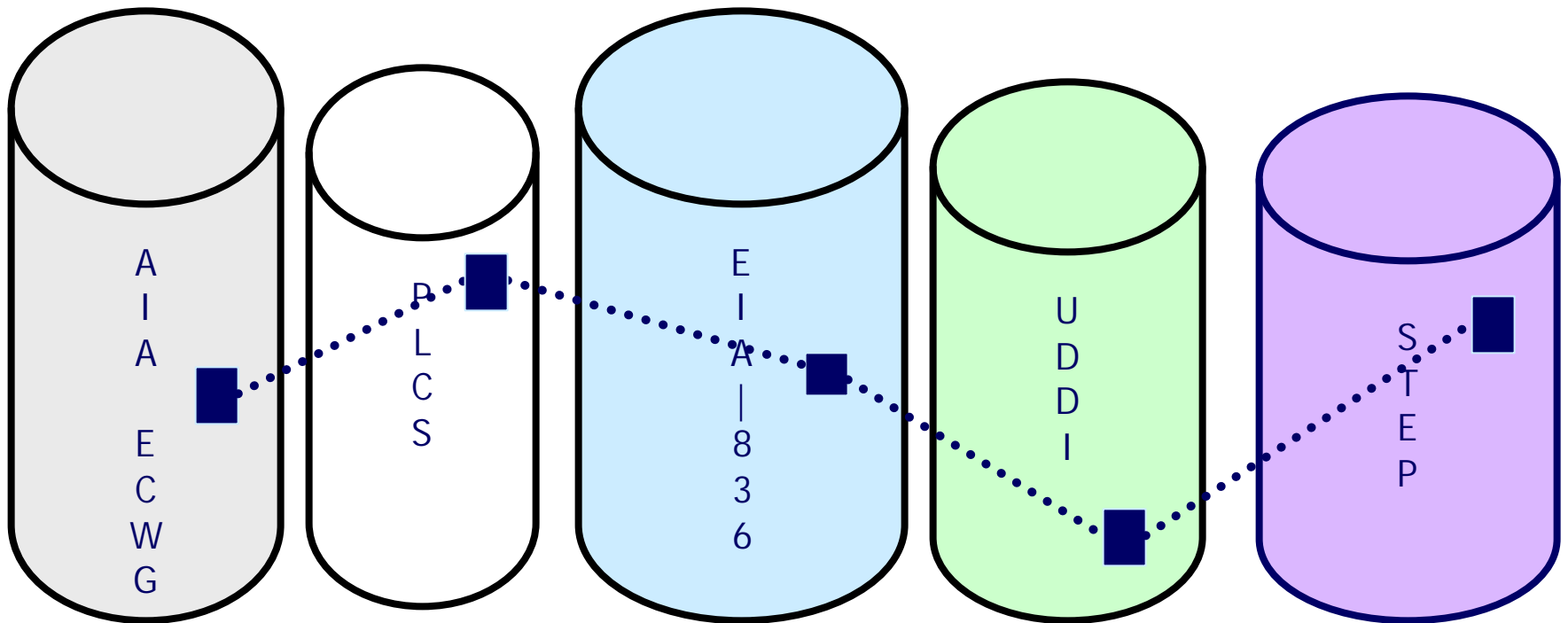
AIA EDI

- **Originating Company Identifier**

- Supports many ID codes

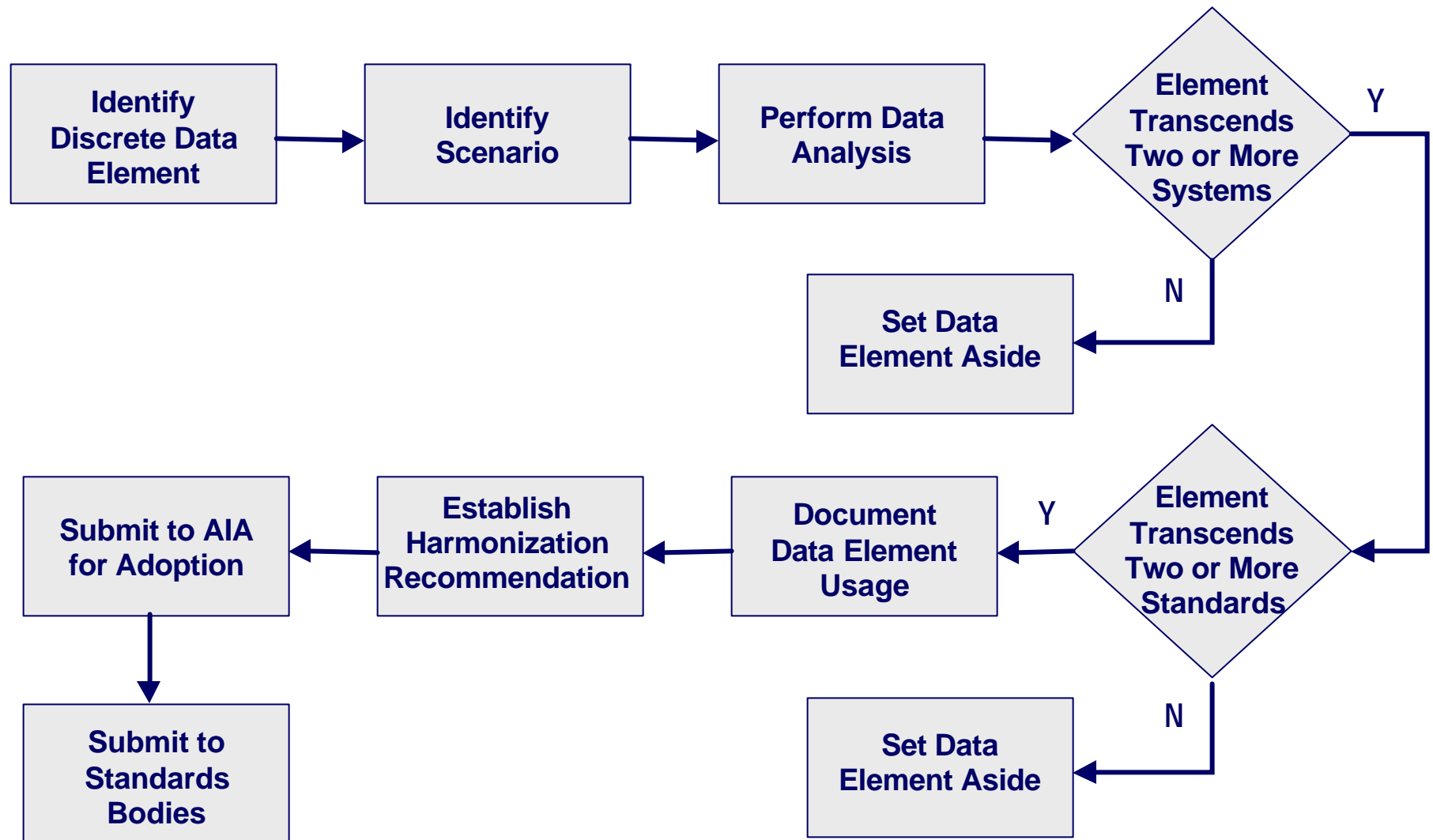 - CAGE, DUNS, FSCM, etc.

- ID length (10 char AN)

AIA proposing process for harmonizing overlaps between standards

Connecting the Dots Across Silo Standards

AIA's Proposed Harmonization Approach

Identify Discrete Data Element → Identify Scenario → Perform Data Analysis → Element Transcends Two or More Systems

Element Transcends Two or More Systems — N → Set Data Element Aside

Element Transcends Two or More Systems — Y → Element Transcends Two or More Standards

Element Transcends Two or More Standards — N → Set Data Element Aside

Element Transcends Two or More Standards — Y → Document Data Element Usage → Establish Harmonization Recommendation → Submit to AIA for Adoption → Submit to Standards Bodies

Content of Industry-wide Repository

Harmonized Data Elements from AIA, EIA836, STEP (PLCS), UDDI – "Components"

Standard Reusable Segments – "Subassemblies"

Standard DTDs and Schema – "Assemblies"

HTML
PDF
Appl

HTML
PDF
Appl

HTML
PDF
Appl

Standard Style Sheets for Display and Applications Mapping

28
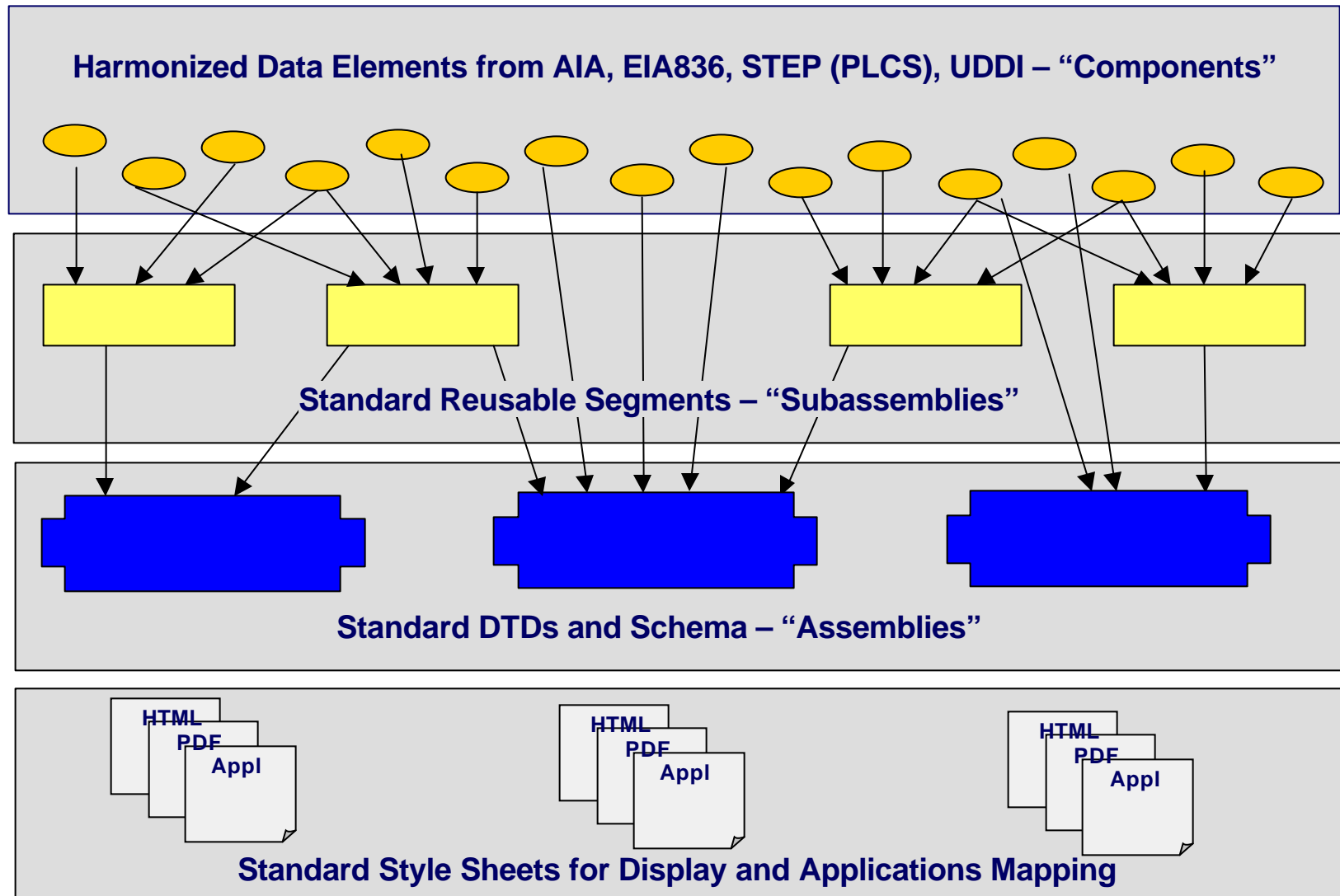
XML Standards Roadmap Summary

	1998				1999				2000				2001				2002				2003			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q

W3C XML 1.0 ✦ ● Widely Supported – too many DTDs

Initially freeware

W3C XML Schema W3C Recommendation ✦ ●

ebXML Specifications ✦ ● Especially IBM, MS and SUN

AIA EDI Transactions and XEDI ✦ XML Solns ●

EIA-836 ✦ ●

Initially IBM, MS and Ariba

UDDI Version1 ✦ ●

STEP Part 28 ✦ ●

PLCS ✧ Initial ✦ Integ w STEP

AIA Harmonized Data Dictionary ✧ Initial ✦

Other - TBD

Key: ✦ Standard ready for vendor support

● Vendor support widely available

Web Site URLs

- W3C XML 1.0 Specification
  - http://www.w3.org/TR/REC-xml

- W3C XML Schema Specification
  - http://www.w3.org/XML/Schema#dev

- Global ebXML Architecture Specification
  - http://www.ebxml.org/specdrafts/approved_specs.htm
  - http://www.ebxml.org/specdrafts/specs_for_review.htm

- AIA Harmonized EDI Transactions
  - http://www.aia-aerospace.org/edi/implcon.cfm

- UDDI Specifications
  - http://www.uddi.org/

- EIA-836 Draft Standard
  - http://www.dcnicn.com/cm/index.cfm

- **ISO 10303 STEP Standard**
  - http://www.nist.gov/sc4/www/stepdocs.htm

- **Product Life Cycle Support (PLCS)**
  - http://www.plcs.org/